

ISTEP+ Mathematics Item Sampler

Updated February 2011

Purpose

The purpose of this Item Sampler is to provide teachers and students with examples of the different types of questions on the ISTEP+ Mathematics assessment. The types of questions include multiple-choice, gridded response (grades 6-8 only), constructed response, and extended response. Teachers are also encouraged to use this information as a resource to help create other assessments and activities.

Constructed Response (CR) and Extended Response (ER) Items

The Applied Skills Assessment contains constructed response and extended response items. Each CR and ER item assesses **Problem Solving** and one Content Standard. The Content Standards that may be assessed on the Applied Skills Assessment are listed below.

Grades (3-5): Number Sense, Computation, Geometry, and Measurement

Grades (6-8): Number Sense, Computation, Measurement, Algebra and Functions

Important Note: ALL STANDARDS are assessed on the Multiple-Choice Assessment.

Constructed response and extended response items require students to show their work. It is critical for students to show their work when responding to these questions as full credit will **NOT** be awarded if no work is shown. Also, incorrect responses may receive partial credit if a correct process or other correct work is shown. Both CR and ER items may require students to provide an explanation or justification within the item. Both item types also require a high level of thinking; however, the ER items may be slightly more complex. Extended response items may also take students longer to respond.

Students should be given several opportunities throughout the year to communicate their knowledge and understanding of mathematics on problems similar to the sample items and released items from previous years. Students must also learn to show their work in a concise and organized manner and to provide valid explanations and justifications when necessary. One goal for all educators should be to challenge students to solve problems that require a high level of critical thinking and reasoning in order to help them develop a broad range of problem-solving skills.

Scoring Rubrics

The Scoring Rubrics used for the CR and ER items were developed in such a way as to score items more holistically and report student scores more accurately. Prior to 2009, ISTEP+ mathematics rubrics were more analytic in nature and reported scores for problem solving, but not the associated content standard. Utilizing a more comprehensive approach, our current scoring rubrics now provide separate scores for problem solving and the content standard for each CR and ER item.

Gridded Response Items (Grades 6-8 only)

Teachers are encouraged to use the Practice Gridded Response Test and Blank Gridded Response Sheets to familiarize students with this item format.

Reference Sheet (Grades 6-8 only)

The ISTEP+ Mathematics Reference Sheet may be used on all Mathematics ISTEP+ tests.

- The 1st page of the reference sheet contains information for Grades 6-8.
- The 2nd page of the reference sheet contains information for Grades 7-8.

Teachers are encouraged to use the reference sheet throughout the year to familiarize students with the structure of and information contained in the reference sheet.

Calculator Policy

Students in grades 6-8 are allowed to use a calculator on the Applied Skills Assessment and on one session of the Multiple-Choice Assessment. Students will not be allowed to use a calculator on the other session of the Multiple-Choice Assessment unless specified in the student's IEP or Section 504 plan.

Please note that the prohibited calculator list is not exhaustive. Changes in technology occur at a rapid pace; thus, it is very difficult to list all of the calculators not permissible. In general, calculators with a QWERTY keyboard, a computer algebra system (CAS), and talking devices are NOT allowed. Be sure to ask your mathematics department chair if you are unsure whether a particular calculator is allowed. You may also contact the Indiana Department of Education at 317-232-9050 for further clarification.

Grade 6 Sample Items

1. Which ordered pair is a solution of $y = x + 4$?

- A. (0, 0)
- B. (5, 54)
- C. (7, 28)
- D. (9, 13)

2. Which of the following is equivalent to $\frac{4}{5}$?

- A. 40%
- B. 0.8
- C. 0.4
- D. 8%

3. Tony ate dinner at a restaurant. His meal cost \$14.65, including tax. How much TOTAL will Tony pay for his dinner if he leaves an 18% tip?

- A. \$2.64
- B. \$14.83
- C. \$17.29
- D. \$32.65

4. The data below shows David's test scores in history class.

65, 85, 85, 85, 90, 90, 95, 95, 100, 100

David's teacher allows him to use the mean, median, or mode of his test scores to represent his final grade. Which of the following gives David the highest final grade?

- A. mean
- B. median
- C. mode
- D. mean and mode are the same

5. Which of the following is equivalent to $|-5|$?

- A. -10
- B. -5
- C. 0
- D. 5

6. Cindy's dinner cost \$12.50, before tax. Cindy must pay 6% tax on her meal. She will also give a 20% tip on the cost of her dinner before tax. How much will Cindy pay, in total, for dinner, tax, and tip?

- A. \$15.10
B. \$15.63
C. \$15.75
D. \$38.00

7. Evaluate:

$$\frac{8 + 6 \times 3}{104 \div 2}$$

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

8. If two angles in a triangle measure 34° and 92° , what is the measure, in degrees, of the third angle?

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

9. What is the solution in the proportion below?

$$\frac{6}{5} = \frac{n}{55}$$

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

10. What is the area, in square feet, of a circle with a diameter of 8 feet? Use 3.14 for pi.

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

11. Sue bought 4 rings for her mom. Each ring cost the same amount of money. The total cost was \$31.

What is the cost, in dollars, for 1 ring?

Show All Work

Answer \$ _____

Write an inequality that can be used to determine the maximum number of rings (r) Sue can buy with \$200.

Inequality _____

Sue claims that she can buy 2 rings for each of her 13 friends with \$200. Is Sue's claim correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

12. Jeff has to determine the cost of border material to install along the perimeter of his rectangular garden. Jeff's garden measures 10 feet by 7 feet. The material costs \$0.42 per foot not including tax.

Jeff states that \$15 will be enough money to cover the cost of material including 6% sales tax. Determine if Jeff's statement is correct. Justify your answer using words, numbers, and/or symbols.

Show All Work

13. It takes 1 ticket to ride the Ferris wheel at an amusement park. The amusement park earns \$144 for each Ferris wheel ride if the cars are full. The Ferris wheel seats 48 people.

Write an equation that can be used to determine the cost (c) for 1 ticket.

Equation_____

The roller coaster ride seats a total of 16 people. It takes 2 tickets per person to ride the roller coaster. One ticket for the roller coaster costs the same amount as one ticket for the Ferris wheel.

If a full Ferris wheel is run 10 times a day, how many full roller coaster rides need to run each day to earn the same amount of money as the Ferris wheel?

Show All Work

Answer_____ **full roller coaster rides**

14. A sixth grade class is going on a field trip to see a play.

For the 27 students to go on the field trip, the van rentals will cost \$545, gas will cost \$130, and admission to the play will cost \$945.

Each student has been paying \$4 every week to pay for the trip. The class has already collected \$864 for the trip.

How many MORE weeks does each student have to pay \$4 per week to have enough money to pay for the entire trip?

Show All Work

Answer _____ **weeks**

The students will also have to pay for the cost of their lunch. The play will provide lunch at a cost of \$7.25 per student.

What is the total amount of money each student will pay for the cost of the field trip, including lunch?

Show All Work

Answer \$ _____

15. Scott is saving money to buy a football ticket that costs \$48.

Scott receives \$5 every week for doing chores at home. Scott spends \$1.50 every week and saves the rest.

How many weeks will it take Scott to have enough money to purchase the football ticket?

Show All Work

Answer_____ **weeks**

Scott can earn extra money by doing chores for his neighbor. His neighbor will pay him \$1.50 for each chore that takes him 45 minutes or less.

What is the maximum amount of time, in HOURS, that Scott would have to spend doing chores for his neighbor to be able to buy a second ticket for his brother?

Show All Work

Answer_____ **hours**

Grade 7 Sample Items

1. Evaluate: $\frac{0.25\left(\frac{1}{2} \div \frac{1}{8}\right)}{-2}$

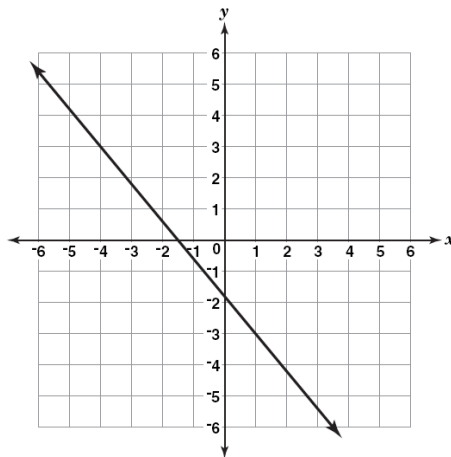
A. $-\frac{1}{8}$

B. $-\frac{1}{2}$

C. -2

D. -8

2. Consider the graph.



Which of the following shows the slope of the line and one point on the line?

A. $\frac{6}{5}$ and (-3, 1)

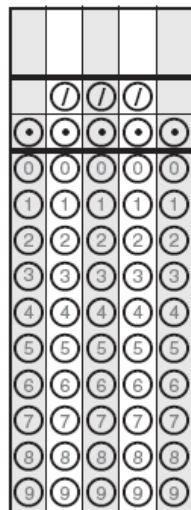
B. $\frac{5}{6}$ and (1, -3)

C. $-\frac{5}{6}$ and (-3, 1)

D. $-\frac{6}{5}$ and (1, -3)

3. Last year, Kim earned \$8 per hour at her job. This year, Kim earns \$10 per hour at her job. What is the percent of increase, in dollars earned per hour, from last year to this year?
- A. 2%
B. 10%
C. 20%
D. 25%
4. Jane is playing a game. The probability of Jane spinning the spinner and it landing on a number less than four is $\frac{3}{8}$. What is the probability of the spinner NOT landing on a number less than four?
- A. $\frac{1}{8}$
B. $\frac{3}{8}$
C. $\frac{5}{8}$
D. $\frac{8}{8}$
5. Square ABCD has a perimeter of 16 feet. What is the perimeter of the square after it is rotated 270° clockwise about point A?
- A. 8 feet
B. 16 feet
C. 32 feet
D. 256 feet

6. Simplify $(3 + 2)^2 - 2^3$.



7. Anita has a map with a scale of $\frac{1}{4}$ inch = 15 miles. Anita measures the distance from her home to her grandmother's home on her map to be 3 inches. What is the distance, in miles, from Anita's home to her grandmother's home?

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

8. Evaluate 4^3 .

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

9. Irene spent half of her weekly allowance playing miniature golf. To earn more money, her parents paid her \$4 to wash their car.

Write an equation that can be used to determine Irene's weekly allowance (a) if she has a total of \$12 after washing the car.

Equation _____

Next week, Irene plans to spend all but \$3 of her allowance to buy 5 bracelets for her friends. Each bracelet costs the same amount of money.

What is the cost of 1 bracelet?

Show All Work

Answer \$ _____

10. Linda sells video game systems at an electronics store. She earns \$80 every week plus \$7 for every video game system that she sells.

Write an expression that represents Linda's weekly earnings given the number of video game systems (v) she sells.

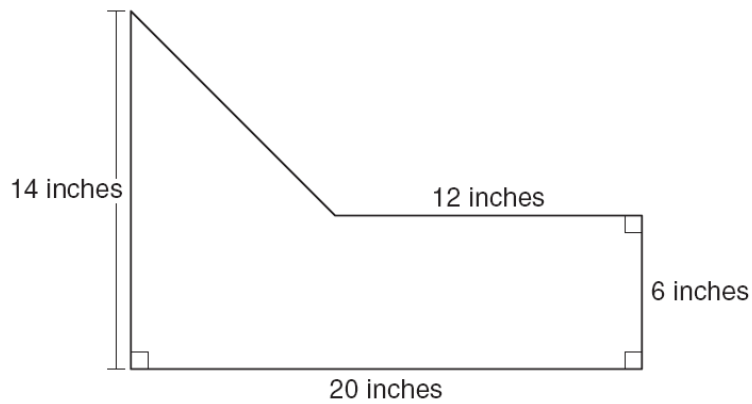
Answer _____

Linda has already saved \$250. Her goal is to have a total of \$600 after working two more weeks. What is the minimum number of video game systems Linda must sell in the next two weeks in order to reach her goal?

Show All Work

Answer _____

11. The diagram below shows the base of a sculpture that Amy made.



Mike made a base that is similar to Amy's base. The dimensions of Mike's base are $\frac{1}{4}$ of the dimensions of Amy's base.

What is the combined area, in square inches, of both bases?

Show All Work

Answer _____ **square inches**

Grade 8 Sample Items

1. Which of the following is an equation of a line with a slope of 4 and a y-intercept of -1?
 - A. $y = 4x - 1$
 - B. $y = 4x + 1$
 - C. $y = -1x + 4$
 - D. $y = -1x - 4$
2. Which of the following is equal to 4.38×10^{-5} ?
 - A. 0.00000438
 - B. 0.0000438
 - C. 438,000
 - D. 43,800,000
3. Agnes put \$500 into an account that earns 2% simple annual interest. How much money will she have in the account after 6 years if she makes no withdrawals or deposits?
 - A. \$60
 - B. \$560
 - C. \$1,100
 - D. \$6,500
4. Which of the following numbers are irrational?

$$\frac{2}{3}, \sqrt{7}, \sqrt{121}, 4.5, \overline{0.2}, \pi$$

- A. $\sqrt{7}, \pi$
- B. $\sqrt{7}, \sqrt{121}, \pi$
- C. $\frac{2}{3}, \overline{0.2}, \pi$
- D. $\frac{2}{3}, \sqrt{7}, \sqrt{121}, 4.5, \overline{0.2}$

5. One side of a right triangle is 10 centimeters. The longest side of the triangle is 26 centimeters. What is the length, in centimeters, of the other side of the triangle?

A. 16 centimeters
 B. 24 centimeters
 C. 28 centimeters
 D. 36 centimeters

6. What is the solution of x in the equation $5x + 26 = 101$?

7. Ben is choosing an outfit to wear to school today. Ben has 3 pairs of pants, 6 shirts, and 2 pairs of shoes. How many combinations of outfits are possible if Ben chooses one pair of pants, one shirt, and one pair of shoes?

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

8. A train traveled at a constant speed for 6 hours. The train traveled 225 miles in those 6 hours. What was the speed, in miles per hour, of the train?

	/	/	/	
•	•	•	•	•
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

9. Tina and Jim each work at a different car wash. Tina is paid \$37 per day plus \$1.50 for each car she washes. Jim is paid \$40 per day plus \$1.00 for each car he washes.

Write an expression that represents the amount Tina is paid each day given the number of cars (c) she washes.

Expression _____

Write an expression that represents the amount Jim is paid each day given the number of cars (c) he washes.

Expression _____

On Monday, Tina and Jim washed the same number of cars and earned the same amount of money. How many cars did they each wash on Monday?

Show All Work

Answer _____

10. A pizza with 2 toppings from Maria's Pizza Place costs \$11.00.
A pizza with 5 toppings from Maria's Pizza Place costs \$14.75.

Each topping at Maria's Pizza Place costs the same amount.

What is the price per topping at Maria's Pizza Place?

Show All Work

Answer \$_____

Write an expression that represents the cost, in dollars, of a pizza at Maria's Pizza Place given the number of toppings (n).

Show All Work

Expression_____

How many 4-topping pizzas can you buy with \$90 from Maria's Pizza Place?

Show All Work

Answer_____4-topping pizzas

11. Natalie earns \$2.50 for each CD she sells and \$3.50 for each DVD she sells. Natalie sold 45 DVDs last year. She earned a total of \$780 last year selling CDs and DVDs.

Write an equation that can be used to determine the number of CDs (c) Natalie sold last year.

Answer _____

How many CDs did Natalie sell last year?

Show All Work

Answer _____

Natalie claims that she can earn more money this year by selling only $\frac{1}{3}$ the number of CDs that she sold last year and by tripling the amount of DVDs she sold last year. Is Natalie's claim correct? Use words, numbers, and/or symbols to support your answer.

Show All Work

Grade 6 Answer Key

1. **D** (Algebra and Functions)
2. **B** (Number Sense)
3. **C** (Computation)
4. **B** (Data Analysis and Probability)
5. **D** (Number Sense)
6. **C** (Computation)
7. $\frac{1}{2}$ (Computation)
8. **54** (Geometry)
9. **66** (Computation)
10. **50.24** (Measurement)

11. Constructed Response Item (Algebra and Functions/Problem Solving)

- \$7.75
- $7.75r \leq 200$
- Sue's claim is not correct. Sue could only buy 25 rings with \$200. That is not enough for each friend to receive 2 rings.

Sample Process:

$$31 \div 4 = 7.75$$

$200 \div 7.75 \approx 25.8$ so 25 is the maximum number of rings that can be bought with \$200

$$25 \div 2 = 12.5$$

12. Constructed Response Item (Measurement/Problem Solving)

- Jeff's statement is not correct. \$15 is enough money to cover the cost of materials before tax is included. The total cost is \$15.14 when tax is included.

Sample Process:

Perimeter of garden: $2(10) + 2(7)$
 $20 + 14 = 34$ feet

$$34 \times \$0.42 = \$14.28$$

$$\$14.28 \times 1.06 = \$15.14$$

13. Constructed Response Item (Algebra and Functions/Problem Solving)

- $48c = 144$
- 15

Sample Process:

$$48c = 144$$

$$c = 144 \div 48$$

$$c = \$3 \text{ per ticket}$$

$$2 \times \$3 = \$6 \text{ per roller coaster ride per person}$$

$$16 \times \$6 = \$96 \text{ for 1 full roller coaster ride}$$

Ferris wheel (full) runs 10 times a day:

$$10 \times 144 = \$1440$$

$$\$1440 \div \$96 = 15 \text{ full roller coaster rides}$$

14. Extended Response Item (Measurement/Problem Solving)

- 7 weeks
- \$67.25

Sample Process:

$$545 + 130 + 945 = 1,620$$

$$1,620 - 864 = 756$$

$$756 \div 27 = \$28 \text{ per student}$$

$$\$28 \div \$4 = 7 \text{ weeks}$$

$$\$1,620 \div 27 = \$60 \text{ per person}$$

$$\$60 + \$7.25 = \$67.25$$

15. Extended Response Item (Measurement/Problem Solving)

- 14 weeks
- 24 hours

Sample Process:

$$\$5 - \$1.50 = \$3.50 \text{ saved each week}$$

$$48 \div 3.5 \approx 13.7 \text{ so 14 weeks are needed}$$

$$\$1.50 \text{ for each chore 45 min. or less}$$

$$\text{So, } \$3 \text{ for 1.5 hours}$$

$$48 \div 3 = 16$$

$$16 \times 1.5 = 24 \text{ hours}$$

Grade 7 Answer Key

1. **B** (Computation)
2. **D** (Algebra and Functions)
3. **D** (Computation)
4. **C** (Data Analysis and Probability)
5. **B** (Geometry)
6. **17** (Algebra and Functions)
7. **180** (Measurement)
8. **64** (Number Sense)

9. Constructed Response Item (Algebra and Functions/Problem Solving)

- $\frac{1}{2}a + 4 = 12$
- \$2.60

Sample Process:

$$\frac{1}{2}a + 4 = 12$$

$$\underline{\quad -4 \quad -4}$$

$$\frac{1}{2}a = 8$$

$$2\left(\frac{1}{2}a\right) = (8)2$$

$$a = 16$$

$$16 - 3 = 13$$

$$13 \div 5 = 2.6$$

10. Constructed Response Item (Algebra and Functions/Problem Solving)

- $80 + 7v$
- 28

Sample Process:

$\$600 - \$250 = \$350$ needed to reach goal

$\$80 \times 2 \text{ weeks of work} = \160

$\$350 - \$160 = \$190$

$\$190 \div \$7 \approx 27.1$

11. Extended Response Item (Measurement/Problem Solving)

- 161.5 square inches

Sample Process:

Amy's Base:

$$20 - 12 = 8 \text{ inches}$$

$$14 - 6 = 8 \text{ inches}$$

$$A_{triangle} = \frac{1}{2} \times 8 \times 8$$

$$= 32 \text{ square inches}$$

$$A_{rectangle} = 20 \times 6$$

$$= 120 \text{ square inches}$$

$$120 + 32 = 152 \text{ square inches}$$

Mike's Base:

$$\frac{1}{4} \text{ of } 14 = 3.5 \text{ inches}$$

$$\frac{1}{4} \text{ of } 12 = 3 \text{ inches}$$

$$\frac{1}{4} \text{ of } 6 = 1.5 \text{ inches}$$

$$\frac{1}{4} \text{ of } 20 = 5 \text{ inches}$$

$$5 - 3 = 2 \text{ inches}$$

$$3.5 - 1.5 = 2 \text{ inches}$$

$$A_{triangle} = \frac{1}{2} \times 2 \times 2$$

$$= 2 \text{ square inches}$$

$$A_{rectangle} = 5 \times 1.5$$

$$= 7.5 \text{ square inches}$$

$$7.5 + 2 = 9.5 \text{ square inches}$$

$$9.5 + 152 = 161.5 \text{ square inches}$$

Grade 8 Answer Key

1. **A** (Algebra and Functions)
2. **B** (Number Sense)
3. **B** (Computation)
4. **A** (Number Sense)
5. **B** (Geometry)
6. **15** (Algebra and Functions)
7. **36** (Data Analysis and Probability)
8. **37.5** (Measurement)

9. Constructed Response Item (Algebra and Functions/Problem Solving)

- Tina: $\$37 + \$1.50c$
- Jim: $\$40 + \$1.00c$
- 6 cars

Sample Process:

Cars Washed	Tina's Pay	Jim's Pay
1	$37 + 1.5(1) = 38.5$	$40 + 1(1) = 41$
2	$37 + 1.5(2) = 40$	$40 + 1(2) = 42$
3	$37 + 1.5(3) = 41.5$	$40 + 1(3) = 43$
4	$37 + 1.5(4) = 43$	$40 + 1(4) = 44$
5	$37 + 1.5(5) = 44.5$	$40 + 1(5) = 45$
6	$37 + 1.5(6) = 46$	$40 + 1(6) = 46$

10. Constructed Response Item (Algebra and Functions/Problem Solving)

- \$1.25
- $8.5 + 1.25n$
- 6 pizzas

Sample Process:

$$\frac{14.75 - 11.00}{5 - 2} = \frac{3.75}{3} = 1.25 \text{ per topping}$$

$$11.00 - (2)1.25$$

\$8.5 for a pizza with no toppings

$$8.5 + 1.25(4) = 13.5$$

$$90 \div 13.5 = 6\frac{2}{3}$$

11. Extended Response Item (Algebra and Functions/Problem Solving)

- $2.50c + 157.50 = 780$
- 249
- Natalie's claim is not correct. She would earn \$680 which is \$100 less than last year.

$$45 \times 3.50 = 157.50$$

$$2.50c + 157.50 = 780$$

$$\underline{- 157.50 \quad -157.50}$$

$$2.50c = 622.50$$

$$c = 249 \text{ CDs sold last year}$$

$$249 \div 3 = 83 \text{ CDs and } 45 \times 3 = 135 \text{ DVDs}$$

$$83 \times \$2.50 = \$207.50$$

$$135 \times \$3.50 = \$472.50$$

$$\$472.50 + \$207.50 = \$680$$

$$680 < 780$$